of the resonant transformer **30** for converting current in the secondary winding of the transformer to a useful form.

[0057] The impulse generator **60** comprises a pulse generator **65** for generating low voltage pulses, a step-up transformer **80** for converting the low voltage pulses from the pulse generator **65** to high voltage pulses, and a spark gap **90** for generating sparks responsive to the high voltage pulses from the step-up transformer **80**.

[0058] The pulse generator **65** comprises a square wave generator **70**, such as a Sinometer VC2002 function signal generator, and solid state relay **75**. The square wave generator **70** generates a digital pulse stream. In one embodiment, the digital pulse stream generates a square waveform with a frequency of about 7.83 Hz. The frequency of the digital pulse stream is selected to match the resonance frequency of the transformer **30**, though such is not necessarily required. The pulse stream output from the square wave generator **70** is applied to the solid state relay **75**. The solid state relay **75** is connected between a battery or other power source and a first winding of the step-up transformer **80**. The battery may comprise a 12 V, 7.0 A/H sealed lead acid battery, such as the ELB 1270A by Lithonia Lighting. The solid state relay **75** functions as a switch that is activated responsive to the waveform from the square wave generator **70** to provide a continuous stream of low voltage pulses from the battery to the first winding of the step-up transformer **80**. A 1 ohm resistor is connected between the solid state relay **75** and step-up transformer **80**.

[0059] The step-up transformer **80** may comprise a Transco 15 kV, 30 mA neon sign transformer (part #S15612). The step-up transformer **80** converts the low voltage pulses from the pulse generator **65** to high voltage pulses that are applied to the spark gap **90**. The step-up transformer has a 0.5 micro-farad capacitor connected in parallel with the primary winding of the step-up transformer **80**. The step-up transformer produces pulses at the output of about 30,000 to 40,000 volts.

[0060] The spark gap **90** comprises a pair of electrodes **95**, **100** separated by an air gap **105**. A suitable spark gap electrode pair is the Information Unlimited SPARK05 ¼-inch×1-inch tungsten electrodes. As previously described, when the voltage potential between the electrodes **95**, **100** reaches a threshold, a spark forms between the electrodes **95**, **100** and supplies a nearly instantaneous, high voltage impulse to the primary winding **35** of the resonant transformer **30**. This high voltage impulse initiates resonance in the resonant transformer **30** inducing current flow from the ground terminal **25** through the primary winding **35** of the resonant transformer **30**.

[0061] The power converter **110** comprises a bridge rectifier **115**, filter capacitor **120**, charge controller **125**, and inverter **135**. A suitable rectifier is the Micro Commercial Components 10 amp, 1000 volt bridge rectifier (Part #GBJL 1010). The bridge rectifier **115** converts the AC current flowing through the secondary winding **40** of the resonant transformer to a DC current. A filter capacitor **120** removes unwanted frequencies from the DC current. A suitable capacitor **120** is Cornell Dubilier 1000uF 450VDC capacitor (part #383LX102M450N082). The filter capacitor **120** has a capacitance of about 1000 micro-farads. The DC current is input to the charge controller **125**. The charge controller **125** may, for example, comprise a maximum power point tracking (MPPT) charge controller, such as a Tracer 4215 BN MPPT Solar Charge Controller, which is commonly used in solar power generating systems. The charge controller **125** applies a small amount of energy to a battery **30** to charge the battery **130**. As previously noted, the battery **130** serves as a power source for the impulse generator **60**. The remaining current is supplied to an inverter **135**, which converts the DC current to an AC current with a desired voltage and frequency, e.g., 120 volts/60 Hz AC. A suitable inverter **135** is the 1500 W Pure Sine power inverter (AIMS) (part #PWRI1500125).The power converter **110** as shown in FIG. **4** may be utilized in the embodiment shown in FIGS. **1**, **2** and **3**.

[0062] FIG. **5** illustrates a power receiver **10** according to another embodiment. The power receiver **10** comprises a plurality of resonant transformers **30** connected between a ground terminal **25** and elevated terminal **15**. Each of the resonant transformers **30** comprises a primary winding **35**, secondary winding **40**, ferromagnetic core **45** and series capacitor **50**. The primary windings **35** of the resonant transformers **30** are connected in parallel. The secondary windings **40** are connected in series with the power converter **110**. An impulse generator **60** applies a high voltage impulse to the primary windings **35** of the resonant transformers **30**. A battery **130** or other external power source supplies power to the impulse generator **60**. The power converter **110** converts the current in the power converter circuit to a usable form for driving a load **140**.

[0063] In one embodiment, each of the resonant transformers **30** shown in FIG. **5** is configured to have a different resonant frequency. In one embodiment, the resonant transformers **30** are configured to resonate at frequencies of 7.83 Hz, 14.8 Hz, 20.3 Hz and 26.8 Hz respectively. Additional resonant transformers **30** could be added to operate at other resonance frequencies.

[0064] FIGS. **6A-6C** illustrate a high quality ground antenna array **200** which may be used as a ground terminal **25**. The ground antenna array **200** comprises a generally cylindrical ground shaft **205** disposed with a hollow cylinder **220** and a plurality of reinforced, heavy gauge ground wires **210** attached at one end to the ground shaft **205**. The ground shaft **205** and ground wires **210** should be highly conductive and have low resistance to supply current from the ground to the power receiver **10**. In one embodiment, the ground wires **210** may be copper or other highly-conductive metal. The end of the ground shaft may be pointed to facilitate insertion into the earth. A connection port on the ground shaft **220** is provided to electrically connect the ground antenna array **220** to the resonant transformer **30**.

[0065] The hollow cylinder **220** has external threads **25** to facilitate insertion into the ground. A rotator nut **235** is fixedly secured to the top end of the hollow shaft **220**. A square shaft **215** protrudes from the top end of the ground shaft **205** into the opening in the rotator nut **235**. FIG. **6B**. A tool **250**, shown in FIG. **7**, engages with the rotator nut **235** and square shaft **215** during insertion of the ground antennas array **200** into the ground as will be hereinafter described.

[0066] The insertion tool **250** is shown in FIG. **7**. The insertion tool **250** includes a tool body **255** having a first socket **260** on one side to fit the rotator nut **235** on the hollow cylinder **220** and a second socket **265** on the other side to fit the square shaft **215** on the ground shaft **205**. Arms **270** extend from the outer periphery of the tool body **255** for manually or mechanically turning the insertion tool **250**.